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Chemotherapy: The Physiological Cost of a Cure

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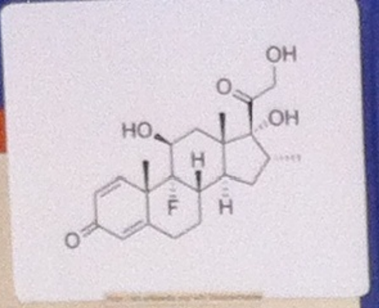
CHEMOTHERAPY:



Dexamethasone, a glucocorticoid chemotherapy drug, has a direct effect on bone formation, which can lead to low bone mineral density, and, when severe, osteoporosis. **Osteoporosis** is a disease that causes weak bones as calcium deposits are depleted and not replaced in adequate amounts, which greatly **increases the risk of fracture**. (1)

Vertebral compression fractures in the lumbar spine of a child with juvenile osteoporosis following chemotherapy

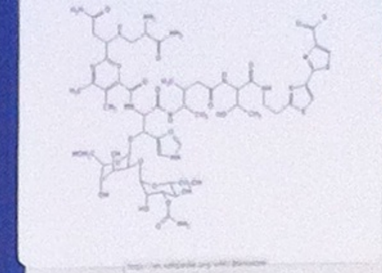
Chemotherapy is defined as "the treatment of disease using chemical agents or drugs that are selectively toxic to the causative agent of the disease, such as a virus, bacterium, or other microorganism". 1

Chemotherapy drugs are **cytotoxic**, meaning they poison the cells in our body that multiply the most rapidly, which is how the majority of cancer cells perform. The major disadvantage to chemotherapy is that the drugs don't just kill the cancer cells that are dividing, but any dividing cell, including the multitude of healthy cells all over the body caught in the act of dividing.

During the course of treatment, as these intentional toxins **attack healthy cells** in the body, the gastrointestinal system is thrown off course, often causing nausea, diarrhea, loss of appetite, cramps, and progressive weakness.

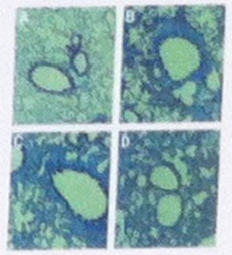
Though the vast majority of unpleasant symptoms often subside by finishing a course of treatment, there are many **long term physiological side effects** that can arise.

Side effects can be physical or emotional, and may be **asymptomatic** for months, or even years, following the end of chemotherapy treatment.



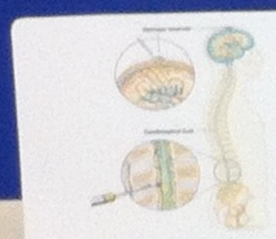
Certain chemotherapy drugs, such as **bleneosane**, may cause pulmonary fibrosis. Patients who receive this type of chemotherapy during childhood are at a higher risk of developing permanent **lung and breathing problems.**

Masson's Trichrome histological sections of lungs from mice showing development of lung fibrosis 14 days after bleneosane treatment.



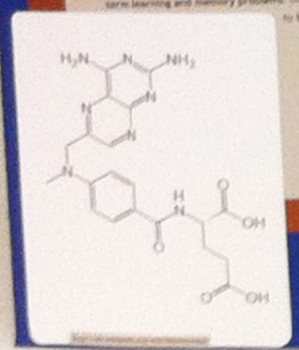
(A) Control, placebo; (B) bleneosane treated; (C) bleneosane and anti-IL-1 (antibody) treated; (D) Bleneosane treated rat.

THE PHYSIOLOGICAL COST OF A CURE

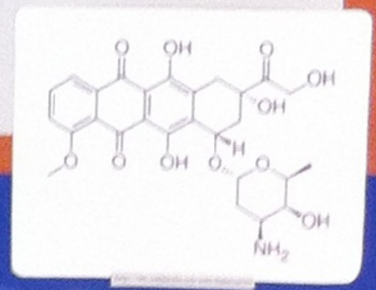


Intrathecal Therapy:
Chemotherapy delivered to cerebrospinal spinal fluid

Of the over 100 **chemotherapy drugs** used, only 3 are used in intrathecal therapy. **Methotrexate**, when delivered into the spinal cord (into the sub arachnoid space, or cerebral spine) may cause **short and/or long term learning and memory problems.** Children who were younger than 5 during treatment are at a high risk for **learning disabilities.**



The chemotherapy drug **doxorubicin** affects the heart muscles as well as structures in the mouth and skin. (2) **Weakening of the heart muscles** makes the pumping of blood more difficult for the heart. When severe, it can lead to **congestive heart failure**. Chemotherapy with **doxorubicin** can also cause changes to the lining of the mouth and the production of saliva, leading to an upset in the healthy balance of bacteria. These changes may lead to **mouth sores, infections, and tooth decay**. (3)



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